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Supplement to the "GAS JOURNAL"

Vol. 4 No. 36

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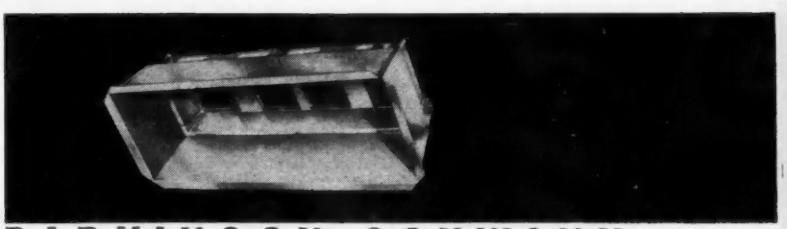

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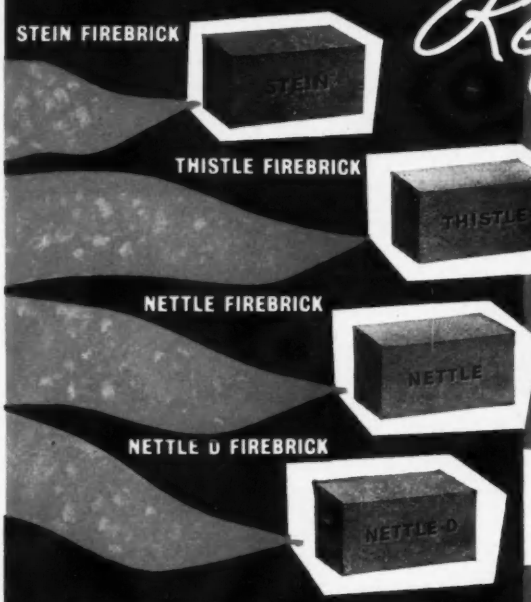

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GAS IN INDUSTRY

MAY 1961

Vol. 4 No. 36

FEATURES

THE ROVER WATCH-WORD IS 'QUALITY' AND GAS IS THERE TO HELP

By Eric Ford

GAS - FIRED MULTI - PASSAGE KILNS—2.

By K. Davis and L. Walker

MODERN FURNACES WHICH BURN TOWN GAS

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Editorial

A handbook for industrialists

IT is now 50 years since the Birmingham gas undertaking first set up its industrial department to promote the industrial use of gas, and it is quite remarkable how successful it has been in this particular field.

The gas industry as a whole is convinced, however, that there is still considerable scope for an increase in the use of gas by industry, and in the past few years has employed a growing number of specialists in the promotion of this particular outlet for gas.

It may sometimes be difficult for industrialists to appreciate fully the many advantages to be gained from the use of gas for processes for which it is eminently suitable, and it is for their benefit that the West Midlands Gas Board has published an attractively produced handbook, 'Gas in the Factory,' which industrial managements should find both useful and instructive. We understand that it is being made available to other Gas Boards for distribution.

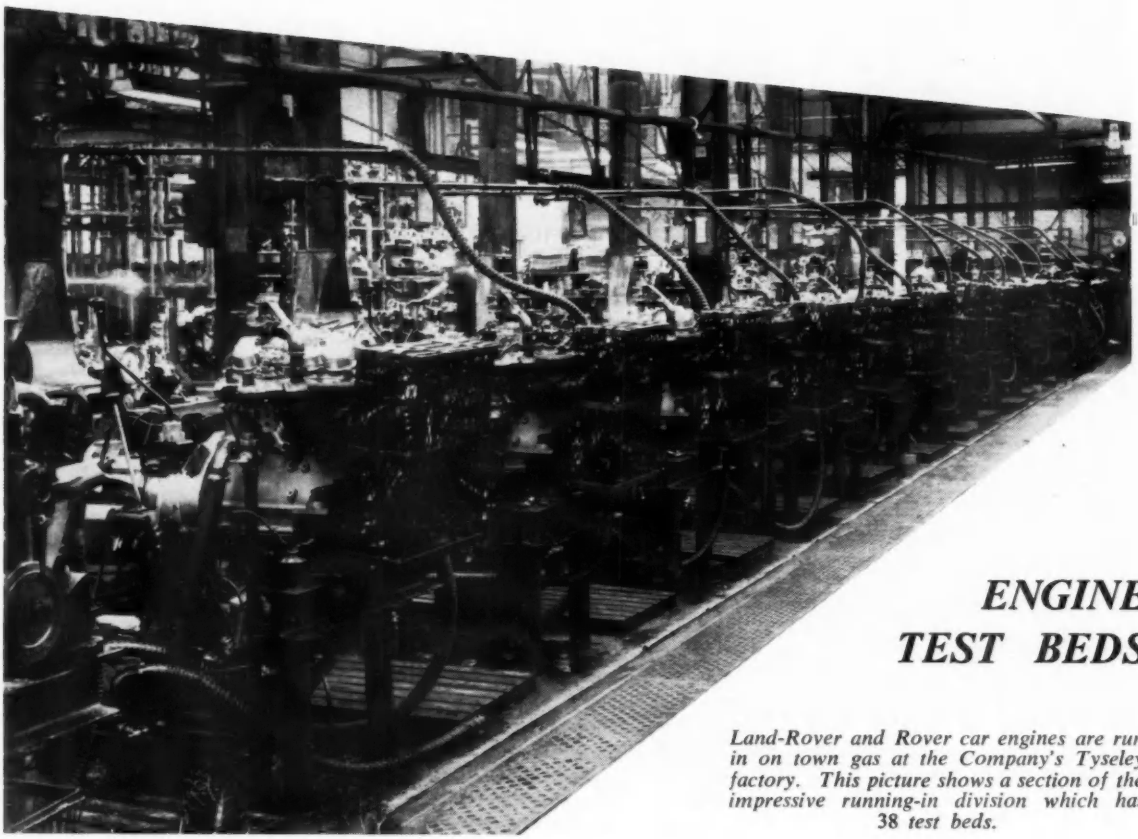
The gas industry has always had some justification for its claim to give service as well as to supply a fuel, even though in some cases its price may be slightly higher than that of the fuel with which it is in direct competition. Quite understandably the full advantage of the service provided may not at first sight appear to the potential customer who is concerned with the cost of the fuel he is being asked to take.

Since the use of gas on the scale on which it is likely to be employed by industry depends for its success on regular supply pressures, constant combustion characteristics and a known content of injurious impurities such as organic sulphur, it is always helpful for the potential industrial customer to be fully conversant with these particular factors and their control, to ensure a uniform utilisation performance. The measurement of gas may also be a little strange to the manager or foreman of a large workshop taking large quantities, especially if the firm has been asked to purchase a very large capacity meter before any gas has yet been laid on or the furnaces installed.

All such points are clearly dealt with in this handbook. The mysteries of calorific value, Wobbe index and the effects of specific gravity, as well as the gas group number may at first seem to be rather a disadvantage, when compared with the simplicity of coal burning or the straight-forward operation of an oil burner. But here again the book supplies the answer in a way that is refreshingly free from complication.

Clearly the selection of a burner for a specific furnace is of great importance, and should the industrialist have no knowledge either of the types available or of their best use under special conditions, there may be some risk of inefficient gas utilisation, unless he relies implicity on the industrial gas engineer who is trying to make a sale.

This book is therefore timely, since it may well clear up difficulties and doubts in the minds of potential industrial gas consumers before they are even approached by the representative of the gas industry, and so promote much goodwill, mutual trust and, perhaps, considerably more business.



ENGINE TEST BEDS

Land-Rover and Rover car engines are run in on town gas at the Company's Tyseley factory. This picture shows a section of the impressive running-in division which has 38 test beds.

AT its various factories in Birmingham, the Rover Company Ltd., uses gas for process work and other applications at the rate of about 1,500,000 therms a year, the supplying authority being the Birmingham Division of the West Midlands Gas Board. Solihull is the site of the headquarters, and it is here that the assembly lines for both Rover cars and Land-Rovers are situated. Components and sub-assemblies are brought to Solihull from manufacturing plants elsewhere in Birmingham and it is at these other centres that the main process work applications of gas are found.

Two of the most important of these plants, so far as gas is concerned, are the Tyseley factory, where the machining, assembly and testing of Rover and Land-Rover engines is carried out, and the factory in Percy Road, Greet, where gear boxes for all Rover vehicles are machined and assembled.

Both of these centres need considerable heat treatment facilities and both have a large quantity of gas-fired equipment for this purpose.

At the Percy Road factory, the Company has a well-organised and effectively laid out heat treatment division in two separate shops.

Batch-type equipment is concentrated in one of the shops, while the other houses some continuous equipment. Both shops are well provided with natural lighting and give an impression of space and efficiency for operation.

Batch-type equipment includes five circular bath type carburising furnaces using prepared town gas as the active carburising medium.

All gear box components are heat treated here according to the requirements laid down. They are first set up on suitable trays and jigs and loaded into retorts for purging.

Then they are transferred manually to the appropriate furnace for a treatment cycle which comprises a preheat, gas carburising and diffusion period. Carburising takes place at 925°C.

COOLING PIT

After the completion of the cycle, the components are removed from the furnace and placed in a cooling pit until reduced to handling temperature.

Equipment in this shop also includes a batch-type gas-fired furnace which is employed on hardening duties. This equipment, which is by Fuel Furnaces Ltd., is of conventional design.

An equally impressive heat treatment shop elsewhere on the Percy Road site houses two large gas-fired continuous furnaces used respectively for cyclic annealing of various forgings and for the stress relieving of cylinder heads and blocks.

British Furnaces Ltd., supplied the gas-fired furnace employed on cyclic annealing. It is fired by air blast burners sited above and below the track, and has an Electroflo pressure regulator.

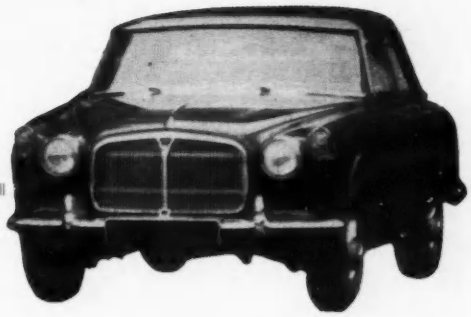
Components for treatment are placed in suitable trays and loaded on to the conveyor at a point a few feet from the furnace door.

In accordance with the automatic timing sequence, the furnace door is drawn upwards and a fresh tray of components is pushed in mechanically.

These and other operations of the furnace are electrically powered.

Process time through the furnaces is 6½ hours, each 'push' taking place

The ROVER watchword is 'Quality' . . . and GAS is there to help



at 12½-minute intervals. The opening and closing of the rear door of the furnace is also automatic, operating in accordance with the timing sequence.

In this furnace, the heating cycle comprises a first heating, second heating and soaking zones, followed by a rapid cool and two slow cooling zones.

The maximum operating temperature employed is 960°C., this being later brought down to 650°C. and held at that level until the slow cool.

Stress relieving of cylinder heads and blocks is carried out in the Salem continuous gas-fired furnace situated alongside the one already described.

This furnace is slightly smaller than its companion and it is also fully automatic in operation.

Cylinder blocks and heads for stress relieving are transported through the furnace on a suitable conveying mechanism.

A slightly different treatment cycle is followed. It consists of first heating, second heating and soaking zones, followed by air cooling. The total process time is 10½ hours, each 'push' of the electrically operated mechanism taking place at 25-minute intervals.

Operating temperatures are in the range 550-575°C. The furnace is top and bottom fired by air blast burners, but at the present time only the bottom set of burners is being used.

Gas supply to both these furnaces is governed down to zero pressure, so that the air/gas ratio is kept constant on control, which is effected by reducing the air pressure only.

Control panels, fitted with controller/recorders for the various zones, are provided for both furnaces. The two panels are positioned close together at a point from which the operator has a clear view of the entry ends of both furnaces.

Great care is taken with the treatment of the components passing through this equipment, as with all the operations at the Rover Company's installations, to ensure that the quality of the product matches up to the high standard demanded by the firm's reputation.

So far as this particular application is concerned, gas has been found to provide the necessary ease of control and flexibility of operation for the

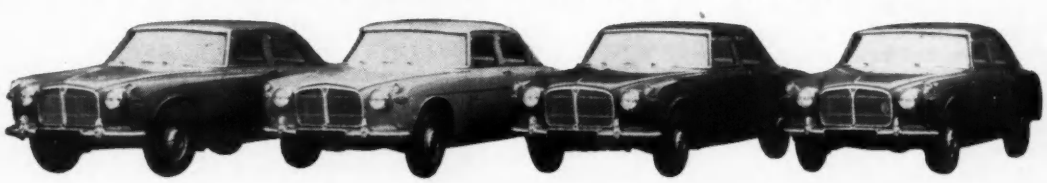
CURRENT RANGE

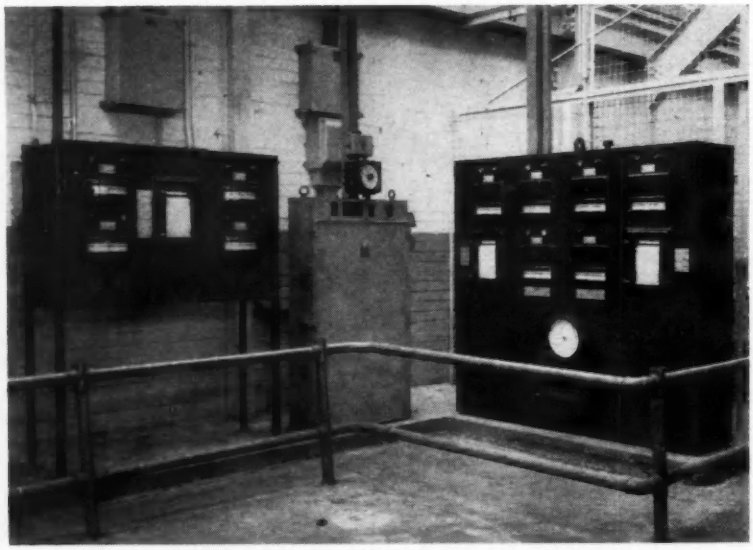
EVER since the earliest days of motoring, successive models of Rover cars have been regarded as outstanding examples of high quality British automobile engineering, says ERIC FORD.

This was never more true than at the present time when the current range of Rover passenger cars offers the discerning motorist a standard of quality of which he may well be proud.

In contrast to this range of private cars, with their distinctive appearance and excellent performance, the Rover Company Ltd. also produces the Land-Rover.

Its rugged construction, powerful performance and versatility have made it a veritable maid-of-all-work in the civil engineering industry, on the land, in the Armed Services—in fact, wherever a multi-purpose vehicle is needed for really heavy-duty work.





A feature of all the gas-fired plant at the Rover Company factories is the design and layout of the control equipment. The panels above are for two furnaces.

rigorous heat treatment procedures required.

Heat treatment equipment at the Tyseley factory, where the engines for both Rover cars and Land-Rovers are machined and assembled, is sited in two adjacent shops.

All the equipment here is of the batch type which is economically most suitable for the treatment of the number and range of components.

This is in tune with the general philosophy of the Rover Company which, while making use of automatic methods where these are applicable, prefers to place the emphasis on the quality of the product rather than on the speed with which it is turned out.

Batch type methods are clearly more suitable to a method of production where individual attention must be given to each type of component and where continual testing and checking of each component at all stages of its production is a regular procedure.

A good example of this is provided by the method adopted in the production of the gears which form an important part of the heat treatment load.

All gears are run in at various stages of their machining and treatment, and once a set of gears has been run together, the members of the set remain together throughout their career in the shop until they are matched in the gearbox.

Engine components requiring heat treatment at the Tyseley plant are brought to the heat treatment section and given the appropriate treatment in one or other of the wide range of furnaces available.

FURNACE USES

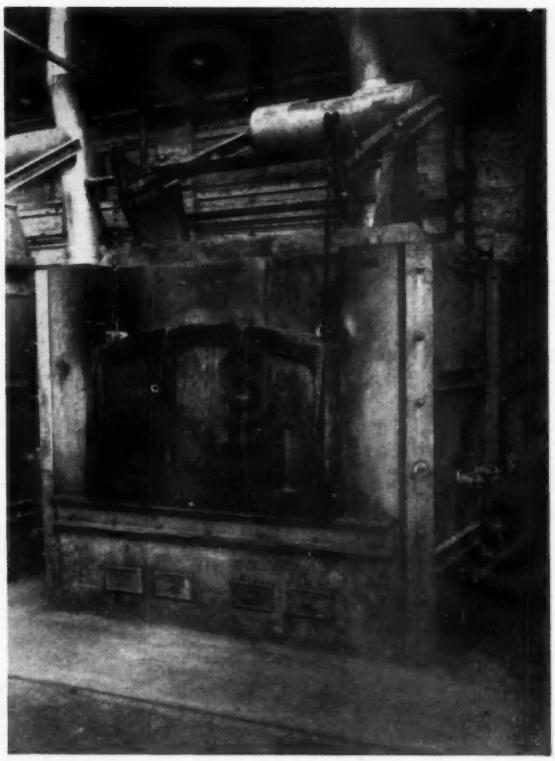
These furnaces between them provide facilities for hardening, tempering, normalising and gas carburising.

In one of the two heat treatment shops, the equipment includes six Brayshaw recuperative furnaces of conventional design, gas-fired by natural draught burners.

These furnaces, which are sited side by side, are mainly employed on hardening duties. Oil quench tanks are placed opposite the door of each furnace.

Components for treatment, including connecting rods and cam-shafts, are placed in trays or on suitable jigs. On completion of the heating cycle,

A bank of Brayshaw gas-fired furnaces at the Tyseley works of the Rover Company. Quench tanks are sited in front of each furnace.



This gas-fired furnace (right) at the Tyseley factory has been fitted with Amal natural draught burners.

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End of the line. Rover 3-litre cars, typical of the Company's renowned quality products, leaving the Solihull assembly line. Gas plays an important part in the production of these popular vehicles.

it is a simple matter to remove the components from the furnace and quench in the nearby tank. A water quench is also provided where this is needed.

An Incandescent Heat furnace is also sited in this heat treatment shop and this gas-fired furnace is employed for normalising.

Also in this section is a low temperature furnace for use where temperatures in the region of 500°C. are needed. This equipment, which is by Fuel Furnaces Ltd., is fired by 14 burners.

RECUPERATOR

A recuperator is fitted along the arch of the furnace and a fan system below the furnace pulls the products of combustion down through the work and the hearth and out at the rear of the furnace.

In the other section of the Tyseley heat treatment plant, the equipment includes a bank of furnaces which are in process of rebuilding and in their new form they are gas-fired by the recently introduced Amal natural draught burners.

These furnaces by Fuel Furnaces Ltd. can either be used for pack carburising, of which only a limited amount is now needed, or for hardening, normalising, annealing and stress relieving.

They are placed side by side and an automatic charging arrangement runs on rails placed at right angles.

The charger incorporates a fork, electrically operated, which can be pushed into the furnace where the prongs of the fork enter between two ramps on the floor.

Work for treatment is placed on the prongs of the charger, the furnace door is opened and the charger moves forward until the work is inside.

At this stage, the level of the prongs is slightly above that of the ramps inside the furnace. The charger operator then lowers the prongs until the work is resting on the ramps.

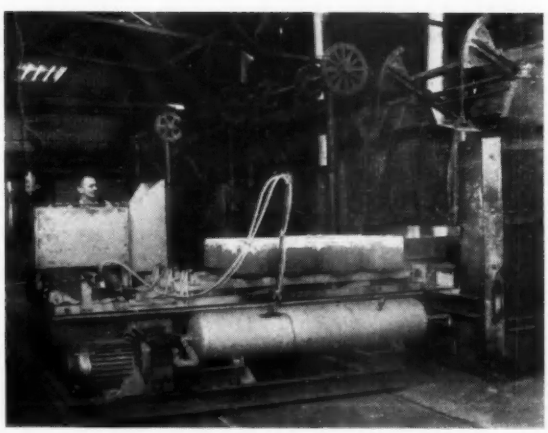
The charger prongs can then be withdrawn, the furnace door closed and the heating cycle begun.

To unload the furnace, a reverse procedure is followed. The furnace door is opened, the charger, with the prongs in the lowered position, is introduced into the furnace and the prongs mechanically raised until the work is lifted clear of the furnace hearth.

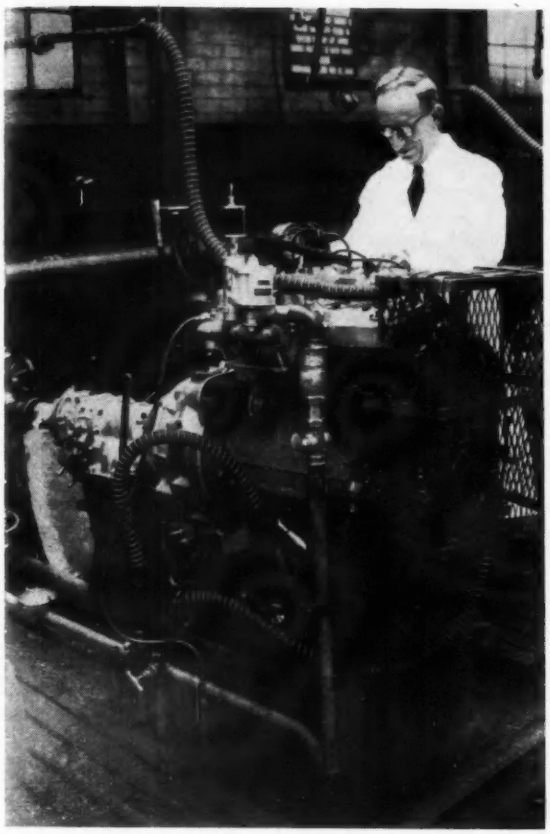
The work can then be withdrawn and removed from the charger for the further treatment required.

Careful control of temperatures is ensured throughout the heat treatment department at Tyseley by Electroflo temperature recorder/controllers.

With such a variety of heat treatment equipment available, there is no difficulty in finding the necessary plant for the different heat treatment procedures demanded by the varied components used in the Rover and Land-Rover engines.



This automatic charger is used for loading and unloading some of the gas-fired heat treatment furnaces at the Tyseley factory.



Close-up of an engine connected up for running-in on town gas. Note the simplicity of the arrangements.

Nevertheless, as will be readily appreciated, there are considerable problems of production control.

Every effort is made to use the furnaces at maximum efficiency by keeping as many of them as possible on the same heat treatment duty for a 'run' of reasonable length, with roughly the same operating temperatures in force.

FLEXIBILITY

At the same time, the range of equipment is such that any type of heat treatment can be made available, virtually at a moment's notice, should it be required.

To the flexibility provided by the variety of equipment is added the flexibility offered by gas, with the result that the heat treatment facilities at Tyseley meet all the requirements of a Company where attention to the quality of the final product is the primary consideration.

Perhaps the most interesting of all the gas applications at the Rover Company Ltd. plant and one which particularly well illustrates the Company's insistence on quality, is the section of the Tyseley works where all Rover and Land-Rover engines are thoroughly run in before being dispatched to the Solihull assembly lines for fitting into the vehicles.

It has been found that not only is gas cheaper for running-in engines than petrol but that the engine, after running-in on gas, is much cleaner all-round than if the petrol were used throughout.

In particular, there is no carbon deposit on the valves and the piston rings are much cleaner.

Rover and Land-Rover engines have now been run in on town gas for four years and all concerned with this operation are highly satisfied with the results.

At the present time, gas consumption is of the order of 2,750,000 cu.ft. per month, which works out at about 163 cu.ft. of town gas per cylinder run in.

ENGINE TESTING

Altogether, there are 38 test beds which, incidentally, have been designed as near as possible to conform to the size and shape of the car mounting in which the engines will eventually be fixed. The test beds are sited side by side in two banks which face each other across a wide gangway.

Engines for running-in are brought to the appropriate test bed on an overhead conveyor, lowered on to the bed and bolted in position.

Gas supply passes through a large capacity meter via 10-in. mains which run behind each bank of test beds. From the main, gas is piped individually to each test bed through a Jeavons J.47 governor.

The final pipe run to the G.M. carburettor is of P.V.C. This gives flexibility of fitting and it can be easily stored when not in use.

EASILY FIXED

To run the engine in on town gas, the gas carburettor is attached to the existing orthodox petrol carburettor. This connection is easily effected, the attachment being made by a metal spring adapter in the case of Solex, or an elbow and P.V.C. sleeves for the S.U. carburettor.

Due to the dry nature of town gas, a drip feed of upper cylinder lubricant is installed. This lubricant, which is laboratory controlled, is allowed to drip into the intake at the rate of 14 drops per minute and serves to lubricate the valves and piston rings.

Once the engine has been bolted in place, on the test bed, it is a simple matter to make the necessary connections of the gas supply, water, oil and the appropriate electrical connections. The engines start and commence firing immediately the starter is pressed.

Rover engines are run in by this means for five hours and Land-Rover engines for two hours. In each case, a strict schedule is observed, involving various speeds and loads.

FULL POWER

As full power is not required until the end of the test this schedule is easily obtained with the gas installation on slightly larger throttle openings.

During the running schedule, experienced test engineers are continually observing the running of the engines and any unusual noise from the engine will be immediately noticed by them.

At the end of the running-in period, the engines are stopped, the gas supply disconnected and the engines run in for a short period of about half an hour on petrol in the normal way.

Power checks and any other necessary adjustments are made and the engine is passed off for dispatch to the appropriate Solihull assembly line.

In the earlier stages, running-in car engines on town gas presented some

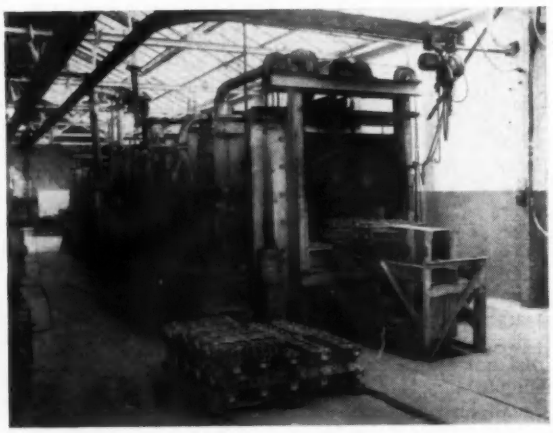
problems. These included explosions in the gas intake if there were any leaks on the intake side or misfiring due to sparking plugs.

These have been solved by venting the float chamber of the petrol carburettor to obviate damage to floats.

Owners of Rover cars or Land-Rovers can therefore be assured that the engine which carries the Rover car smoothly and effortlessly along the highway or which enables the Land-Rover to haul its way over the roughest countryside has been subjected to running-in tests which, in length and thoroughness, are unique for vehicles of this type.

Nor is this the last test to which the engines are subjected before they are called upon to respond to the demands of the eventual owner.

A general view of a corner of one of the heat treatment shops at the Rover Company's Percy Road factory.



A Salem continuous gas-fired heat treatment furnace at the Percy Road factory, showing the burner arrangement.

About 11,000 employees are engaged at the various Rover Company plants on the production of the three models of Rover cars—namely, the '80', the '100' and the new 3-litre, and the two models of Series 2 Land-Rovers, the short (88-in.) wheelbase and the long (109-in.) wheelbase.

Although there are several assembly lines engaged on the production of both Rover cars and Land-Rovers, the impression the visitor gains is of great variety, both in colours and finish.

For example, only rarely will two cars of the same exterior finish be seen together on the same line and the variety of Land-Rover models is astonishing.

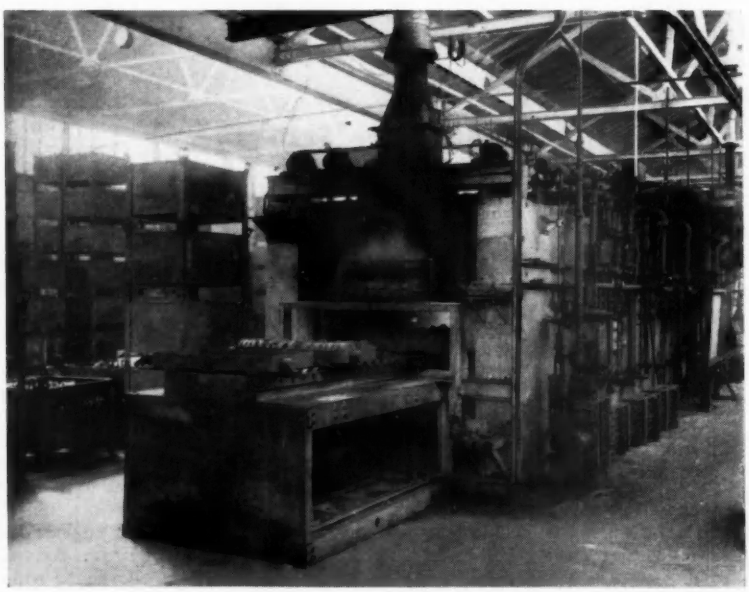
The number of left-hand drive

Concluded on page 116

Every car and Land-Rover which leaves the assembly lines at Solihull is thoroughly tested on the Company's own test track and any necessary final adjustments are made.

At Solihull, an interesting compromise has been effected between the need to utilise assembly line methods, which are so essential a feature of the motor car industry, and the requirements of the Company's policy of quality production.

One way in which this compromise has been effected is by ensuring that each operator is engaged over a period of time on a number of different operations, ensuring that he retains a wider range of skills, and takes a craftsman's interest in what otherwise becomes a routine task.



A gas-fired continuous furnace by British Furnaces Ltd., used by the Rover Company for cyclic annealing.

Gas-fired multi-passage kilns

By K. DAVIS,

Divisional Industrial Gas Officer, North Staffs. Division, West Midlands Gas Board,

and L. WALKER,

Assistant Industrial Gas Officer, Industrial Department Headquarters.

THIS is the concluding section of the abstract of a paper presented to the Midland Junior Gas Association at Birmingham. The first section appeared in 'Gas in Industry' on April 5.

Fig. 12 shows a typical time/temperature cycle for a passage fitted with one burner and superimposed is the type of cycle obtained by using two burners.

Multiple burners also presented a problem. Products of combustion from the rear burner affected the burner in front, and incomplete combustion occurred. This was eventually overcome by shutting off the secondary air fan and increasing the exhaust pull slightly.

The blown secondary air was creating a pressure region around the burner position and preventing the inducement of primary air. Shutting off this air and increasing the exhaust pull slightly, allowed more primary air to be entrained due to the slight negative pressure at the burner flame ports, and the problem was solved.

It is important that offtake dampers not in use on the kiln should provide a good seal, as leakages of hot air from these points have a marked effect on the kiln performance. It must be borne in mind that the gas consumption of the kiln is very low, and a number of small heat losses can add up to a large percentage of the total heat input.

A fast cycle will, of course, tend to push that peak zone towards the exit end and to overcome this the offtake vent on the entrance is opened to pull heat back towards the entrance. When pushing has stopped to allow further bats to be positioned on the pusher gear, the peak starts to move again towards the entrance, and this is pushed forward again as pushing begins again.

A continuously swinging peak temperature is, therefore, experienced, and although this does not appear to affect firing conditions and may, in fact, have the effect of extending the soaking zone, a simple device was incorporated on the prototype kiln to prevent this swing, if required.

A thermocouple was positioned on the exit end of the firing zone and coupled via a temperature controller to a motorised flap damper in the entrance end offtake vents. When the peak moved towards the entrance, the thermocouple temperature dropped, and this closed the damper reducing the 'pull' on the entrance vents.

When the peak moved towards the exit, the thermocouple temperature rose and increased the 'pull' on the entrance vents. By this means, the peak is held in position, and, in fact, can be moved within a limited distance by adjusting the setting of the temperature controller operating the offtake damper.

Four of these kilns have been constructed by Gibbons Brothers Ltd., for manufacturers in the Stoke-on-Trent district. The first was constructed some 2½ years ago, and has been in continuous production ever since, firing glazed tiles at a temperature of 1,060°C.

The annual consumption for the kiln amounts to approximately 4¼ mill. cu.ft. and the output is in the order of 1,000 sq. yards of tiles a week. The cost of gas is approximately £20 per week for this output. Previously the firm concerned used coal-fired intermittent kilns, and the fuel cost was then over £100 per week.

Two further kilns were constructed for firing glazed tiles, but with this particular consumer difficulty was experienced due to a milky appearance on the surface of mottled tiles after firing.

Following a thorough investigation, the cause was found to be the effect of glaze vapour concentrating in the firing zone of the kiln, and it was necesary to open slightly one of the offtake dampers in the work passages

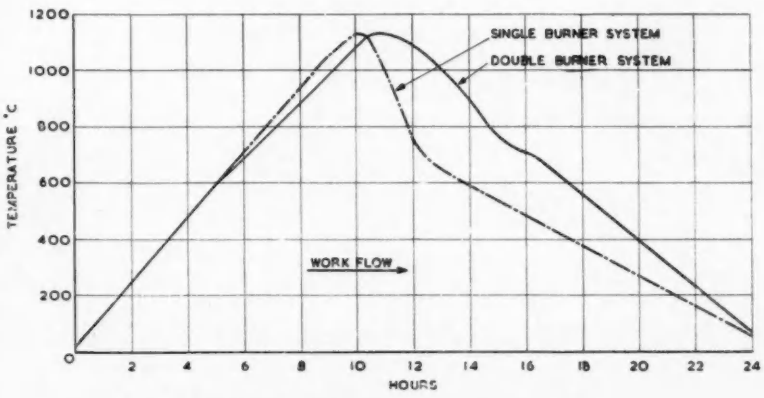
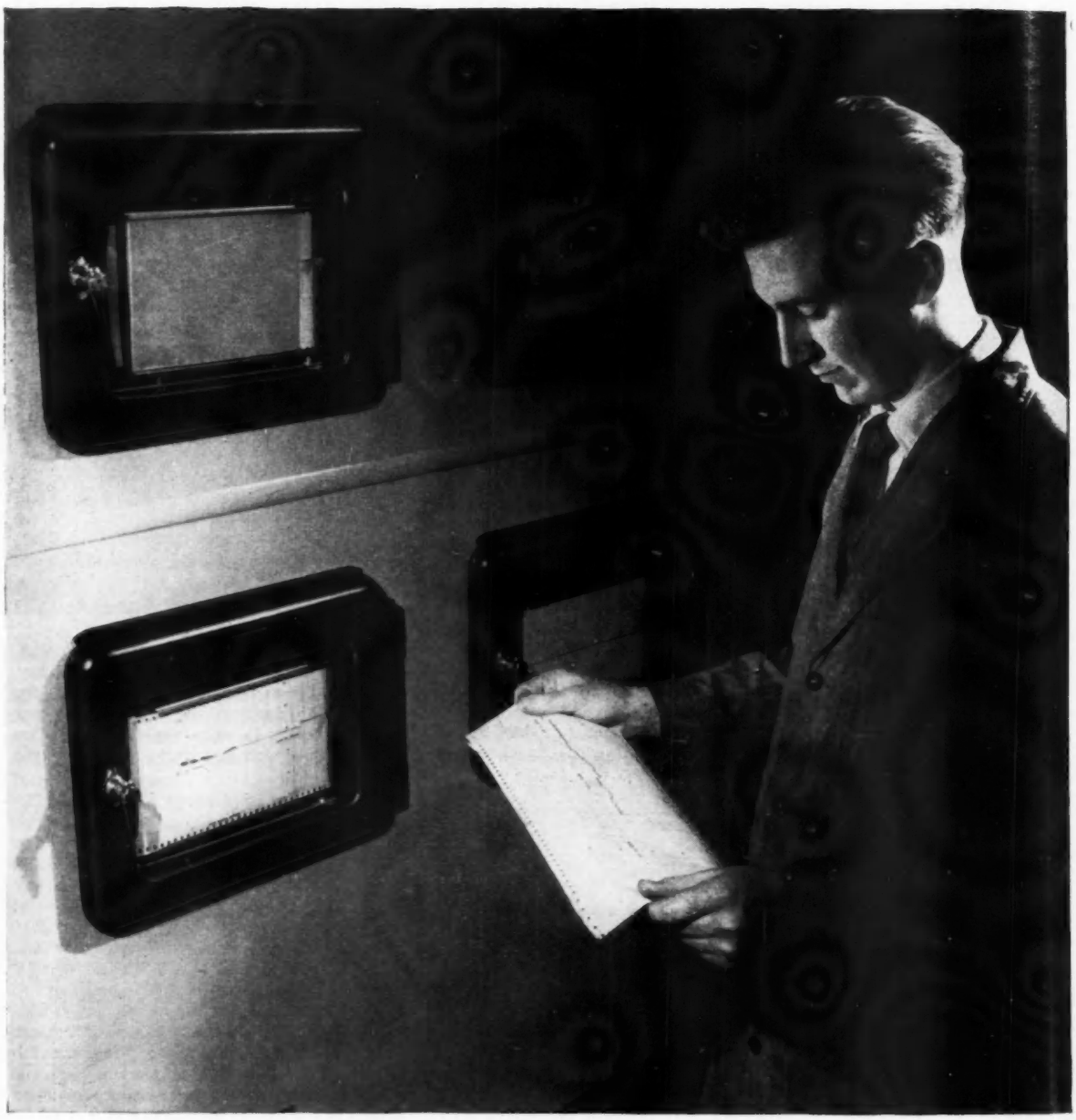


Fig. 12—Typical time/temperature cycles.

He reads it easily...

A clear record of the last two shifts—and the pen already beginning its course on the next chart. In his hand he has the past: on the panel is the present. Arkon Recorders measure gas, air, water and effluent flow, pressure or vacuum, or pressure and vacuum; flows in one inch pipe or 36 inch mains, pressures from 0.1 inches water gauge to 500 lb. per square inch. They give a clear, unmistakable record which you can read like a book, without hesitation and without mistakes. You can leave the chart on for a few hours, a day, or a week—the record will always be there. Easily read, easy to look after, robust enough to stand on the job, Arkon Instruments can help the control of any process—and their accuracy will satisfy even the men in the lab.



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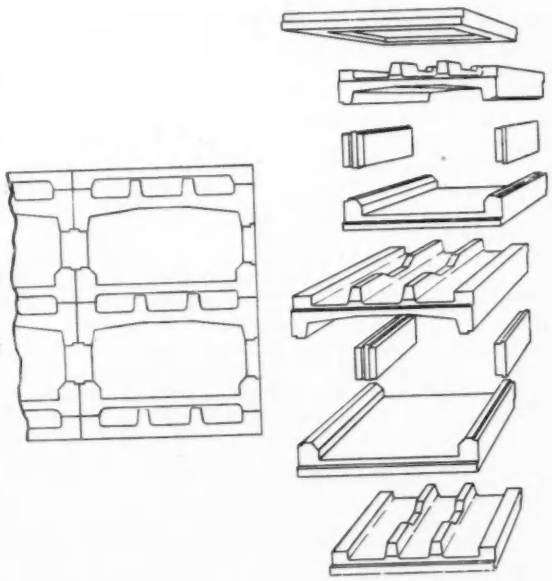


Fig. 13—Mark II passage sections. (Patents applied for.)

in order to allow the vapours to escape before the concentration reached the point where the discoloration occurred. It was necessary occasionally to clear the offtake flue of the crystallised glaze vapour in order to keep the work passages clear.

SIX PASSAGES

The fourth kiln constructed by Gibbons Brothers Ltd. has six passages and is used for firing earthenware biscuit pottery. This kiln has four passages 7½ in. high and two passages 9 in. high, in order to accommodate coffee pots in two of the passages.

The original design of the multi-passage kiln was intended for a top working temperature of 1,100°C. and following completion of the firing trials for manufacturers up to this temperature, it was decided to examine the performance of the refactory combustion chambers with a working passage temperature of 1,200° to 1,250°C.

After a prolonged period, the refractory chambers showed signs of softening, and the roofs of the work passages tended to 'squat.' It was evident, therefore, that attention would be required to the design of the passage sections if kilns were required for operation in excess of 1,100°C. It was felt that a limited market would exist for kilns to operate in the temperature range of 1,100 to 1,250°C. and work was commenced on the revised design.

CHAIRMAN'S AID

The Chairman of the Board, Mr. G. le B. Diamond, who had shown great interest in the development of the original multi-passage kiln, gave some thought to the problem of operating at higher temperatures, and it was at his suggestion that attention was given to designing combustion chambers having an arched section which would form the roof of the work passages.

The original combustion chamber sections were moulded in one piece as previously described, but the final design for the Mark II sections,

Fig. 14.

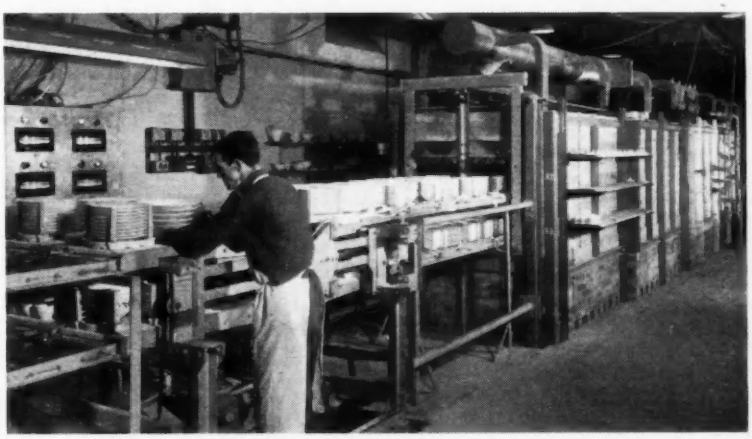


Fig. 15.

which is shown in Fig. 13, consists of two separate mouldings. It will be seen from the diagram that in addition to arching the lower section, ample stiffening ribs have been provided wherever possible. The diagram also shows the special sections which form the sides of the work passages.

On completion of the design, sufficient mouldings were ordered to enable the prototype kiln at Longport to be partially re-constructed using two passages of the Mark II design. When this work was carried out, an additional ducting system was provided in order to give complete independence of control for the two sides of the kiln.

The sections are now undergoing life tests at temperatures in the order of 1,250°C. in the work passages, but preliminary trials have already shown that the modified design is more flexible in response to temperature requirements during operation, and also it is more responsive when coming up to temperature from shut-down conditions. The revised design should enable kilns to be built for operation at a temperature of 1,200°C.

MARK II DESIGN

Since the revised design offered advantages to the kiln builders inasmuch as the special sections required were easier to manufacture, it was decided that the Mark II design should be used for all temperatures. Therefore, it was a logical development that the next kiln to be constructed in the area was built to Mark II design even though the operating temperature was to be below 1,100°C.

The firm interested in this project was Johnson Brothers Ltd., the manufacturers of earthenware domestic pottery. On behalf of this firm, extensive trials on the firing of glazed earthenware had already been undertaken at Longport, and based on the results of these, Mr. E. James Johnson decided to build a kiln on his own premises in order that complete production data could be obtained.

This kiln is 44 ft. long having work passages 15 in. wide by 8½ in. high and is illustrated in Figs. 14 and 15. The complete installation provides an excellent example of the modern approach to production in the potteries, and extensive use has been made of roller conveyor and monorail conveyor systems.

Sufficient ware is glazed and decorated during five eight-hour shifts a week to keep the multi-pasage kiln in operation continuously, night and day, seven days a week. In order to accommodate the ware waiting to be fired, the roller conveyor system has been made of sufficient length to form the necessary reservoir.

The kiln is at present operating at a firing temperature of 1,050°C. with a cycle of 8 hours 20 minutes. The output for a 168-hour week is between 4,500 and 5,200 dozen mixed pieces, which includes a large proportion of dinner-ware. The gas rate for this output is in the order of 625 cu.ft. an hour (470 c.v.). The management is well satisfied with the performance of the kiln, and the quality of the glaze is very high indeed.

Firing costs have been halved when compared with an orthodox open flame tunnel kiln. It is quite probable that the conditions of operation for this particular kiln are on the economic limit of the design, as the combustion products are leaving at quite a high temperature and the ware s leaving the kiln at the exit and j t too hot for handling.

As previously mentioned, t e management regards this first kiln s a trial unit which will provide th n with sufficient data on which to b e their future developments. It is c visaged, however, that several of th e kilns will be installed by this firm o handle this particular type of load.

As this paper is being prepared, Gibbons Brothers Ltd., have begun construction of an installation having eight passages, which will be used for firing 'once-fired' earthenware domestic pottery to 1,150°C. This unit will again be of the Mark II design, and should be producing ware early in April. The passage height in this kiln will be 9½ in.

ROVER WATCHWORD IS 'QUALITY'

Continued from page 112

versions on the assembly lines is equally surprising until one realises that no less than three-quarters of the production of this vehicle is destined for sale overseas.

No fewer than 30 countries have specified Land-Rover vehicles for their armed services.

Assembly lines demand constant attention from the personnel working on them and many of the facilities required by the modern workman for his comfort and his refreshment have to be built into the system.

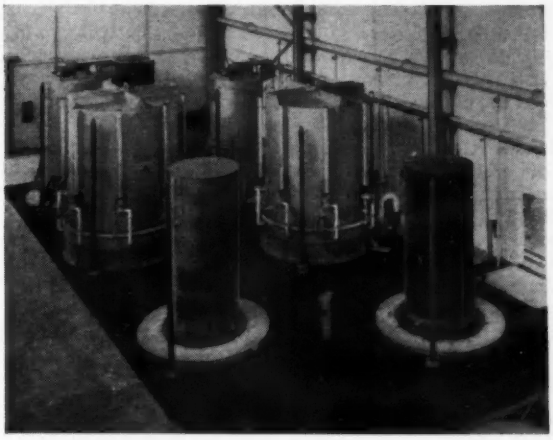
A good example at the Rover plant is the siting of gas-fired tea stations at convenient points throughout the factories.

Well-appointed canteen facilities are also provided and these are serviced by gas-fired kitchens.

It is, therefore, clear that in one way or another gas plays an important part in the Rover Company organisation and the West Midlands Gas Board may well be proud of the supply and service it extends to its distinguished customer whose vehicles worthily uphold the good name of British motor vehicle engineering.

A party of Russian gas experts, who were in Britain for an I.G.U. Council meeting, visited the West Midlands Area, including in their tour an inspection of the West Midlands Gas Board's Industrial Research Laboratories in Birmingham.

Modern furnaces which burn town gas



Part of a gas-fired, radiant tube-heated lift-off annealing furnace installed at Lancashire and Corby Steel Manufacturing Co. Ltd., Corby, Northants.

FURNACES employing town gas are becoming increasingly popular with industry and there have been several recent installations by The Incandescent Heat Co. Ltd., Smethwick, Birmingham, to which attention might well be drawn.

The top photograph shows part of a gas-fired, radiant tube-heated lift-off annealing furnace installed at Lancashire and Corby Steel Manufacturing Co. Ltd., Corby, Northants, suitable for coils of strip steel 46 in. dia., with a stacking height of 128 in. Each furnace has an output of 1 ton per hour, operating at 750°C.

The forced cooling hoods that considerably reduce cooling time are also shown.

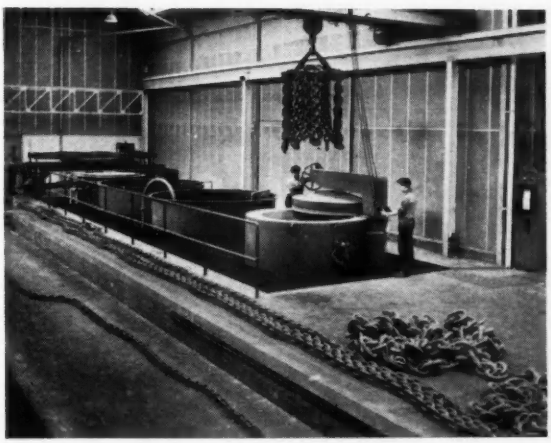
These furnaces are similar to those supplied to Somesia steelworks in Argentina and the single stack furnaces being built for the new Richard Thomas & Baldwins' Spencer Works, Llanwern, near Newport, Mon.

Two furnace companies worked together to produce the new hardening, tempering and normalising plant for chain at The British Steel Chain Co. Ltd., which is seen in the centre photograph.

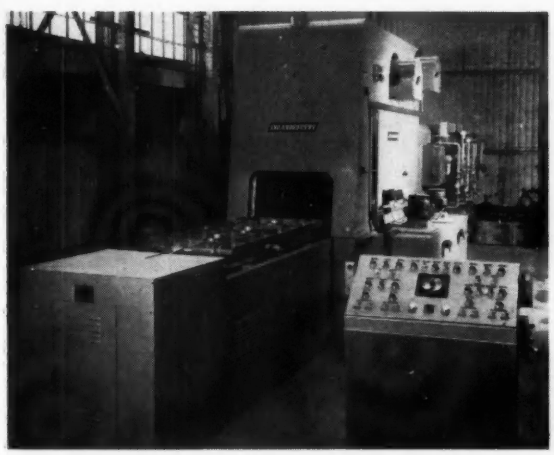
The hardening and normalising furnace is of the Incandescent pit type, arranged for town gas-firing, using specially designed radiant bowl burners and is suitable for operating within the temperature range 700-950°C.

This application ensures uniform temperature conditions through the heating chamber, high rate of heat transfer to the stock and maximum thermal efficiency.

The effective working dimensions of the furnace are 7 ft. deep by 5 ft. dia., for dealing with chains having a maximum length of 90 ft. 2-in. thick material and having an approximate weight of 25 cwts.



Hardening and normalising furnace for town gas-firing at the chain plant of The British Steel Chain Co. Ltd.



The Incandescent sealed quench furnace, suitable for controlled atmosphere heat treatment.

The combustion system is divided into two zones, each zone being equipped with automatic temperature controlling and recording equipment. The cover or lid is carried on a fabricated mild steel frame equipped with bogie wheels, the lid being raised from the sand seal by four hydraulic jacks, while traverse of the lid and supporting frame is effected manually by hand wheel.

The furnace chamber is lined with high temperature insulation refractories backed by high grade solid insulation, the complete brickwork structure being encased in a circular

casing, reinforced by rolled steel sections.

The work is carried on a specially designed jig and support stand.

Tempering is carried out in a Metalectric electrically-heated vertical air circulation furnace of similar dimensions, which is equipped with a swing lid and a simple geared lifting device. This unit is designed for operating accurately at temperatures up to 750°C and the applied electrical rating of the furnace is 222 kW.

QUENCH TANKS

The plant is complete with oil and water quench tanks, together with recirculation and cooling devices.

The Incandescent sealed quench furnace, which is shown in the lower picture, is one of a range now being manufactured of which the smallest has an effective work area of 3 ft. by 2 ft. by 1 ft. 9 in. and the largest an effective working area of 8 ft. by 3 ft. by 2 ft. this being, as far as is known, the largest plant of its type in Europe.

The furnace is suitable for controlled atmosphere heat treatment up to a temperature of 1,000°C such as carbonitriding, carburising, clean hardening, annealing and normalising.

Varying degrees of automatically-controlled mechanised operations are offered, covering the process of charging the furnace, the transferring of work trays and quenching under controlled atmosphere conditions.

The furnace is equipped with heat resisting alloy roller tracks, to facilitate charging and discharging of the charge which is supported in jigs or baskets on alloy work trays.

Heating of the furnace is by means of the patented fuel-fired radiant 'Jetube' system. These Jetubes are manufactured in spun cast alloy tubes and of extremely robust construction. This method of heating ensures close uniformity of temperature, high rate of heat transfer to the stock, the minimum of maintenance trouble and maximum thermal efficiency.

Following the recent closure of other small gasworks in Scotland, the Carluke works will cease production. The Carluke supply will come from Motherwell, Hamilton or Uddingston by the newly linked-up pipeline.

The Deputy Chairman of the North Thames Gas Board, Dr. J. Burns, has presented 43 employees of the Board—each with 40 years' service to his credit—with long service awards at a ceremony in the Brian Wood Pavilion on the Board's sports ground at Acton.

Carburising plant order for Scotland

ORDERS have been received by British Furnaces Ltd., Derby Road, Chesterfield, for gas carburising equipment to be installed in the Scotstoun factory of Albion Motors Ltd.

They cover four super Allcase sealed quench furnaces, complete with fully automatic sequence control, Dew Point controlled RX endothermic atmosphere generating plant, and other ancillary equipment, such as tempering furnace, and a power operated charging machine.

This plant will provide completely up-to-date final heat treatment for the firm's transmission gears.

The new Lurgi gas supply from Westfield has affected gas lamps in parts of Kirkcaldy, Fife. Mr. W. A. Campbell, Lighting Superintendent, said that the Lurgi supply was carbonising the by-pass tips in the burners and putting out the flame. There was a night-shift wagon going round checking on the lamps.

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